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EXAMINER	
TRAN, THIEN S	

ART UNIT	PAPER NUMBER
4151	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/525,938	BAGAVATH-SINGH, VIJAYAVEL	
	Examiner	Art Unit	
	THIEN TRAN	4151	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 August 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *10/6/2008 & 8/23/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1-4, 8 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by Suh (US Patent Pub 2004/0251242). Suh is a prior art reference found in the applicant's IDS.

3. Regarding claim 1, Suh teaches forming a metal section on a metal substrate by depositing a plurality of superimposed layers using a laser (Laser cladding and Laser-aided direct metal manufacturing) (Abstract, Lines 1-5) generating a heating beam (Fig 5, Item 202 [not shown in drawing]) (Pg 4, 0055)

and a powdered metal source (Fig 4, Item 404) (Pg 3, 0046) operative to feed metal powder into the beam (Pg 3, 0046) and moving the substrate relative to the beam under numerical control over a programmed path to provide an advancing melt pool (Fig 4, Item 402) (Pg 4, 0050), comprising: sensing parameters (height) of the melt pool (Abstract, Lines 9-13) at a plurality of selected coordinates (Pg 4, 0060) during the generation of a plurality of metallic layers, storing the sensed parameters of the pool at each of the selected coordinates (Claim 1, Lines 9-11), and processing the stored parameters (Fig 4, Item 403) (Pg 4, 0054) to determine an appropriate laser power for use during the deposition of a subsequent layer (Fig 11C, Pg 6, 0080 & 0083).

4. Concerning "plurality of selected coordinates", the examiner interprets that Suh teaches "plurality of selected coordinates" because the CCD camera (Fig 6, Item 601) obtains the image of the molten pool (Fig 5, Item 203) every 20 msec and transmits image information to the image processing apparatus (Fig 4, Item 408) (Pg 4, 0060). At every 20 msec one height dimension of the melt pool is captured at that position or coordinate, therefore over the entire length of the deposition layer there are a plurality of height measurements at a plurality of coordinates.

5. Concerning "during the generation of a plurality of metallic layers", the examiner further interprets (reference Fig 11C), that each step of the "staircase shape line" is equivalent to the 1 cladding (deposition) layer. The chart shows that the overall height (H) of the cladding layer is composed of a plurality of height (Ht) of metallic layers (step) where the height (Ht) of each layer is stored

and monitored and used in real time to control the laser power to adjust the height (Ht) of the current or subsequent layer to achieve the overall height (H) of the cladding layer (Pg 4, 0054 & Pg 6, 0081 & 0083).

6. Regarding claim 2, as applied to claim 1, Suh teaches where processing the stored parameters (Fig 4, Item 403) (Pg 4, 0054) comprises comparing a matrix of the sensed parameters (Pg 5, 0078) stored during formation of the last layer deposited with the matrix of the sensed parameters of an earlier deposited layer (Claim 1, Lines 9-11) to determine an appropriate laser power for use during the deposition of the next layer (Fig 11C, Pg 6, 0080 & 0083).

7. Regarding "matrix of sensed parameters", the examiner interprets that "matrix of sensed parameters" to be equivalent to "plurality of selected coordinates". Therefore, Suh teaches "plurality of selected coordinates" because the CCD camera (Fig 6, Item 601) obtains the image of the molten pool (Fig 5, Item 203) every 20 msec and transmits image information to the image processing apparatus (Fig 4, Item 408) (Pg 4, 0060). At every 20 msec one height dimension of the melt pool is captured at that position or coordinate, therefore over the entire length of the deposition layer there are a plurality of height measurements at a plurality of coordinates.

8. Regarding claim 3, as applied to claim 1 and 2, Suh teaches where the earlier deposited layer constitutes the second layer deposited over the substrate (Fig 11C, Pg 6, 0083). Concerning "earlier deposited layer constitutes the second layer", the examiner interprets (reference Fig 11C), that each step of the "staircase shape line" is equivalent to one cladding (deposition) layer. The first

step (Ht) of the “staircase shape line” is layer 1, the second step is the height (Ht) of layer 2 and the third step is the height (Ht) of layer 3 and so on. Each deposition layer height is stored and monitored and used in real time to control the laser power to adjust the height (Ht) of the current or subsequent layer to achieve the overall height (H) of the cladding layer (Pg 4, 0054 & Pg 6, 0081 & 0083).

9. Regarding claim 4, as applied to claim 1, Suh teaches where the sensed parameters of the pool comprise the dimensions of the pool (Height of a melt pool) (Abstract, 9-11).

10. Regarding claim 8, Suh teaches forming a metal section on a metal substrate by depositing a plurality of superimposed layers by using a power source (Laser cladding and Laser-aided direct metal manufacturing) (Abstract, Lines 1-5) generating a heating beam (Fig 5, Item 202 [not shown in drawing]) (Pg 4, 0055) and a metal source operative (Fig 4, Item 404) (Pg 3, 0046) to feed metal powder into the beam (Pg 3, 0046) and moving the substrate relative to the beam over the section to provide an advancing melting pool (Fig 4, Item 402) (Pg 4, 0050), comprising sensing parameters (height) of the melt pool (Abstract, Lines 9-13) at a plurality of selected coordinates (Pg 4, 0060) during the generation of a plurality of metallic layers, storing the sensed parameters of the pool at each of the coordinates (Claim 1, Lines 9-11), and processing the stored parameters (Fig 4, Item 403) (Pg 5, 0076) to determine an appropriate laser power for use during deposition of a subsequent layer (Pg 6, 0080 & 0083).

11. Concerning "plurality of selected coordinates", the examiner interprets that Suh teaches "plurality of selected coordinates" because the CCD camera (Fig 6, Item 601) obtains the image of the molten pool (Fig 5, Item 203) every 20 msec and transmits image information to the image processing apparatus (Fig 4, Item 408) (Pg 4, 0060). At every 20 msec one height dimension of the melt pool is captured at that position or coordinate, therefore over the entire length of the deposition layer there are a plurality of height measurements at a plurality of coordinates.

12. Concerning "during the generation of a plurality of metallic layers", the examiner further interprets (reference Fig 11C), that each step of the "staircase shape line" is equivalent to the 1 cladding (deposition) layer. The chart shows that the overall height (H) of the cladding layer is composed of a plurality of height (Ht) of metallic layers (step) where the height (Ht) of each layer is stored and monitored and used in real time to control the laser power to adjust the height (Ht) of the current or subsequent layer to achieve the overall height (H) of the cladding layer (Pg 4, 0054 & Pg 6, 0081 & 0083).

13. Regarding claim 9, in view of claim 8, Suh teaches where the power source is a laser (Fig 4, Item 401) (Pg 3, 0044).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to

> be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

16. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suh (US Patent Pub 2004/0251242) as applied to claim 1, in view of Chang (US Patent 5,681,490). Suh and Chang are prior art references found the in the applicant's IDS.

17. Regarding claim 5, Suh does not teach where the sensed parameters of the pool comprise the optical intensity of the weld pool. In analogous art of laser weld quality monitoring system, Chang discloses where the sensed parameters comprise the optical intensity of the weld pool (Light) (Abstract, Lines 2-4) for the benefit of determining the progressive stages of the laser process and the expected weld quality (Abstract, Lines 13-15). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Suh with the sensor of Chang for the benefit of determining the progressive stages of the laser process and the expected weld quality.

18. Regarding claim 6, Suh does not teach where the sensed parameters of the pool comprise the dimensions of the pool and the optical intensity of the pool. In analogous art of laser weld quality monitoring system, Chang discloses where the sensed parameters comprise the optical intensity of the weld pool (Light) (Abstract, Lines 2-4) for the benefit of determining the progressive stages of the laser process and the expected weld quality (Abstract, Lines 13-15). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Suh with the sensor of Chang for the benefit of determining the progressive stages of the laser process and the expected weld quality.

19. Regarding claim 7, Suh does not teach where the sensed parameters of the melt pool comprise the temperature of the melt pool. In analogous art of laser weld quality monitoring system, Chang discloses where the sensed parameters of the melt pool comprise the temperature of the melt pool (Abstract, Lines 2-5) for the benefit of determining the progressive stages of the laser process and the expected weld quality (Abstract, Lines 13-15). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Suh with the sensor of Chang for the benefit of determining the progressive stages of the laser process and the expected weld quality.

20. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Suh (US Patent Pub 2004/0251242) as applied to claim 8, in view of Jang (US

Patent 6,180,049). Suh and Jang are prior art references found in the applicant's IDS.

21. Regarding claim 10, in view of claim 8, Suh does not teach where the power source is an electron beam. In analogous art of layer manufacturing, Jang discloses where the power source is an electron beam (Column 8, Lines 24-25) for the benefit of producing a phase change near the focused spot for effecting deposition of a material onto the target surface (Column 8, Lines 21-24). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Suh with the electron beam of Jang for the benefit of producing a phase change near the focused spot for effecting deposition of a material onto the target surface.

22. Claims 11, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suh (US Patent Pub 2004/0251242) as applied to claim 8, in view of Lewis (US Patent 5, 837,960). Suh and Lewis are prior art references found in the applicant's IDS.

23. Regarding claim 11, in view of claim 8, Suh does not teach where the power beam level is maintained at a constant during generation of each layer. In analogous art of laser production of articles from powders, Lewis discloses where the power beam level is maintained at a constant during generation of each layer (Column 10, Lines 66-67) for the benefit of producing articles without the use of molds, patterns, forming dies or cutting tools (Column 3, Lines 37-39). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Suh with the constant power beam of Lewis for the

benefit of producing articles without the use of molds, patterns, forming dies or cutting tools.

24. Regarding claim 12, Suh teaches forming a metal section on a metal substrate by depositing a plurality of superimposed layers (Laser cladding and Laser-aided direct metal manufacturing) (Abstract, Lines 1-5) using a heating beam (Fig 5, Item 202 [not shown in drawing]) (Pg 4, 0055) and a powdered metal source (Fig 4, Item 404) (Pg 3, 0046) operative to feed metal powder into the beam (Pg 3, 0046) and moving the substrate relative to the beam under numerical control over a programmed path to provide an advancing melting pool (Fig 4, Item 402) (Pg 4, 0050), comprising: depositing a first layer (Fig 5, Item 205) (Abstract, Line 10) in contact with the substrate (Fig 5, Item 201) (Pg 4, 0065) using a first heating beam power (Fig 5, Item 202 [not shown in drawing]) (Pg 4, 0055); depositing a second layer (Fig 11C, Item Ht) (Pg 6, 0080 & 0083) over the first layer using the same heating beam power (Fig 5, Item 202 [not shown in drawing]) (Pg 4, 0055) as used in the first layer and sensing parameters of the melt pool (height) (Abstract, Lines 9-13) at a plurality of selected coordinates (Pg 4, 0060) during the generation of said second layer (Fig 11C, Item Ht) (Pg 6, 0080 & 0083); depositing a third layer (Fig 11C, Item Ht) (Pg 6, 0080 & 0083) using the same heating beam power as employed in the first two layers and sensing parameters of the melt pool (height) (Abstract, Lines 9-13) at said selected coordinates (Pg 4, 0060) during generation of the third layer; and using the stored parameters (Fig 4, Item 403) (Pg 5, 0076) of the melt pool during generation of the second and third layers to determine an appropriate

heating beam power for use during deposition of subsequent layers (Fig 11C, Pg 6, 0081 & 0083).

25. Suh does not teach using the same heating beam power as employed in the first two layers. In analogous art of laser production of articles from powders, Lewis discloses using the same heating beam power as employed in the first two layers (Column 10, Lines 66-67) for the benefit of producing articles without the use of molds, patterns, forming dies or cutting tools (Column 3, Lines 37-39). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the teachings of Suh with the constant power beam of Lewis for the benefit of producing articles without the use of molds, patterns, forming dies or cutting tools.

26. Concerning "depositing a plurality of superimposed layers", the examiner interprets that it is well known in the art that laser cladding and laser-aided direct metal manufacturing is a multi-layer manufacturing process that builds articles one layer at a time as disclose in the "Background Art" of Suh in paragraphs 0008, 0009 and 0010.

27. Concerning "plurality of selected coordinates", the examiner further interprets that Suh teaches "plurality of selected coordinates" because the CCD camera (Fig 6, Item 601) obtains the image of the molten pool (Fig 5, Item 203) every 20 msec and transmits image information to the image processing apparatus (Fig 4, Item 408) (Pg 4, 0060). At every 20 msec one height dimension of the melt pool is captured at that position or coordinate, therefore

over the entire length of the deposition layer there are a plurality of height measurements at a plurality of coordinates.

28. Concerning “depositing a first, second and third layer”, the examiner further interprets (reference Fig 11C), that each step of the “staircase shape line” is equivalent to one cladding (deposition) layer. The first step (Ht) of the “staircase shape line” is layer 1, the second step is the height (Ht) of layer 2 and the third step is the height (Ht) of layer 3 and so on. Each deposition layer height is stored and monitored and used in real time to control the laser power to adjust the height (Ht) of the current or subsequent layer to achieve the overall height (H) of the cladding layer (Pg 4, 0054 & Pg 6, 0081 & 0083).

29. Regarding claim 13, as applied to claim 12, Suh teaches where as each subsequent layer is deposited, the parameters of the melt pool are sensed (height) (Abstract, Lines 9-13) at said plurality of selected coordinates (Pg 4, 0060) and are used, along with previously stored sensed parameters, to determine the heating beam power for subsequent layers (Fig 11C, Pg 6, 0081 & 0083). Concerning "plurality of selected coordinates", The examiner interprets that Suh teaches “plurality of selected coordinates" because the CCD camera (Fig 6, Item 601) obtains the image of the molten pool (Fig 5, Item 203) every 20 msec and transmits image information to the image processing apparatus (Fig 4, Item 408) (Pg 4, 0060). At every 20 msec one height dimension of the melt pool is captured at that position or coordinate, therefore over the entire length of the deposition layer there are a plurality of height measurements at a plurality of coordinates.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to THIEN TRAN whose telephone number is (571)270-7745. The examiner can normally be reached on Mon-Thurs, 8-5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Ortiz can be reached on 571-272-1206. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/T. T./
Examiner, Art Unit 4151

/Angela Ortiz/

Supervisory Patent Examiner, Art Unit 4151